Data-Based Engineering Science and Technology / *Sciences et technologies de l'ingénierie basées sur les données*

Foreword

Engineering sciences and technology, as any other branch of sciences and technology, are experiencing the data revolution. In the past, models were more abundant than data, too expensive to be collected, and analyzed at that time. However, nowadays, the situation is radically different, data is much more abundant (and sometimes more accurate) than existing models, and a new paradigm is emerging in engineering sciences and technology.

Advanced clustering techniques not only help engineers and analysts; they become crucial in many areas where models, approximation bases, parameters... are adapted depending on the local (in space and time senses) state of the system.

Machine learning is also helping for extracting the manifold in which the solutions to complex and coupled engineering problems are living. Thus, uncorrelated parameters can be efficiently extracted from the collected data coming from numerical simulations, experiments, or even from the data collected from adequate measurement devices.

Model learners, deep learning, and other techniques based on manifold or dictionary learning, tensor formats, sparse sensing, advanced nonlinear regression, and DMD, among many others, are capturing the interest of the applied mathematics community.

Sampling issues, addressing noise and uncertainty, are crucial to move from the nowadays big-data framework to the incipient smart-data paradigm.

Thus, the subtle circle is closed by linking data to information, information to knowledge, and finally knowledge to real-time decision-making, opening unimaginable possibilities within the so-called DDDAS (Dynamic Data Driven Application Systems).

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